UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF COMMERCIAL FISHERIES

CALIFORNIA FISHERY MARKET NEWS MONTHLY SUMMARY

December 1961

Part II–Fishing Information*

Sea-surface temperatures, fishing and research information of interest to the West Coast tuna-fishing industry and marine scientists

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COOPERATIVE TROLLING PROGRAM, 1961

Since 1956, the U. S. Navy has operated a radar early warning surveillance network off the west coast of the United States. This system consists of 5 continuously-occupied stations spaced at intervals between latitudes 32° N. and 50° N. at a distance of 200-400 miles from shore. Several vessels participate in a continuous-rotation schedule; periods of guard duty range from 20-30 days, and each vessel rotates from station to station during the year.

For the past two years, the U. S. Bureau of Commercial Fisheries Biological Laboratory, San Diego, has sponsored a cooperative albacore-trolling program aboard these picket vessels. The program has proven highly successful, for it has provided valuable scientific information to the Bureau and has offered a unique recreational opportunity to the participating crew members. Each vessel is equipped with a kit of fishing gear and a measuring board. The kits contain sets of trolling rigs consisting of a 30-fathom line, shock-cord assembly, and a standard commercial feather trolling jig. The lines are lashed to the stern rail of the vessel. Fishing strategy is uniform, since the picket vessels maintain about 3-4 knots' steerageway while steaming on station. Catches are recorded (including the length of time each line is fished) on special log sheets provided in each fishing kit. All vessels begin fishing in April each year, and terminate on November 1.

The first catch of the 1961 season was reported by the U. S. S. TRACER at station 5 on June 8, just 3 days later than last year (table 1).

Table 1.--Date of first albacore catch and water temperature at U. S. Navy radar picket stations, 1961.

Station number	Approximate position		Date of first catch	Water temperature (°F)
	Latitude	Longitude		
1	47° N.	130° W.	August 13	60
2	43° N.	130° W.	July 7	63
3	40° N.	133° W.	June 29	59
4	35° N.	132° W.	June 17	64
5	32° N.	124° W.	June 8	64

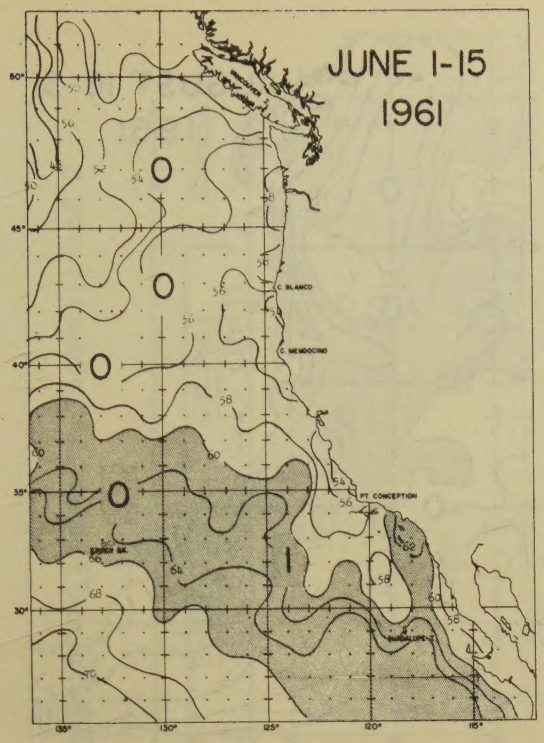
No fish were taken again at this station until June 24; after this date fishing improved and several large schools were reported by the U. S. S. PICKET, which had relieved the TRACER. Water temperatures ranged from 64° to 66° F. during the period. Catches occurred 3 days later than in 1960 at station 4, whereas the catches at stations 3 and 2 were respectively 11 days and 8 days earlier this year. No albacore were reported from station 1 in 1960; 7 fish were taken this year in August. Sea temperatures at station 1 averaged 2-4 degrees warmer than last year during the July-September interval.

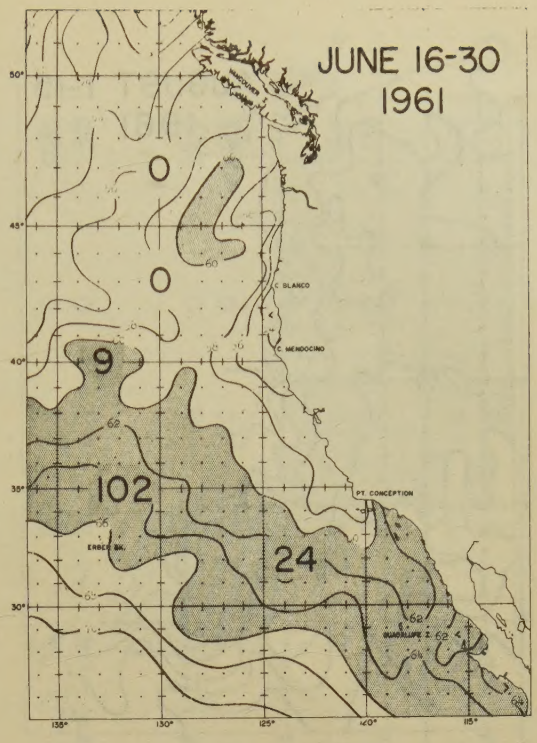
The northward progression of the albacore fishery appears largely dependent upon the annual northward extension of the 60-66° F. temperature zone (figures 1-2). Data recently published by H. B. Clemens[1/] of the California Department of Fish and Game indicate that about two-thirds of the total 1954-1958 California albacore landings for the months June-September were caught in waters ranging from 60-66° F. This zone is shaded in figures 1 and 2. Twenty percent of the total season's catch made by the picket vessels came from waters warmer than 66° F.

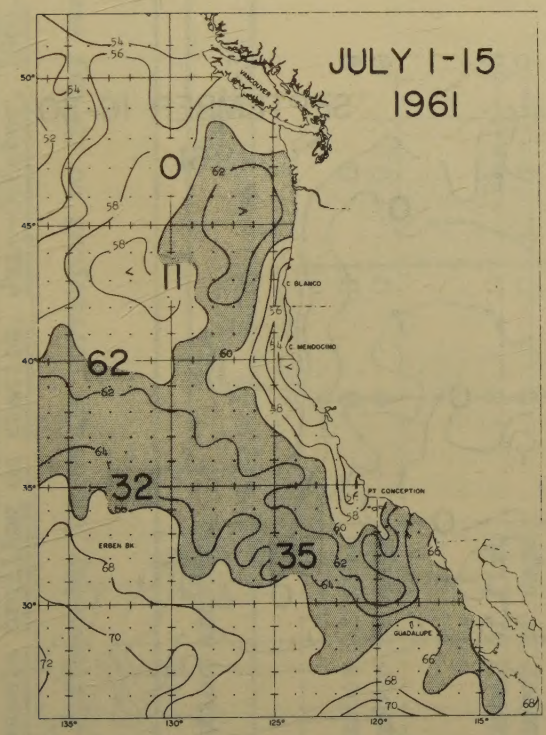
The highest total catch for the season was reported at station 3 (table 2). During July-August, catches were made on 46 of 62 days at this station (ibid.). The season total of 58 catch-days exceeded by two or more times the number of days on which catches were made at any other station. Inspection of the fishing effort data showed that although each participating vessel fished with considerable variation in effort, the adjusted catches were clearly higher at station 3 than at all others. Water temperatures appeared optimal for albacore for a period lasting approximately 12 weeks; it began on June 16 and ended about September 9.

Data are accumulating which suggest that the annual albacore migration into Pacific Coast waters extends over a prolonged time interval. The high catches at stations 3 and 4 also suggest that the northern extension of the fishery may develop from inbound migrants moving within the "optimum" temperature zone directly from the west as well as up the coast from the south as suggested by other investigators. The strategic location of the picket vessels (which are monitoring essentially fixed positions) makes their catch data of particularly useful application in the study of seasonal availability of the albacore to the U. S. West Coast tuna fleet.

1/ Clemens, Harold B. 1961. The migration, age and growth of Pacific albacore (Thunnus germo), 1951-1958. Calif. Dept. Fish and Game, Fish Bull. No. 115: 1-128.







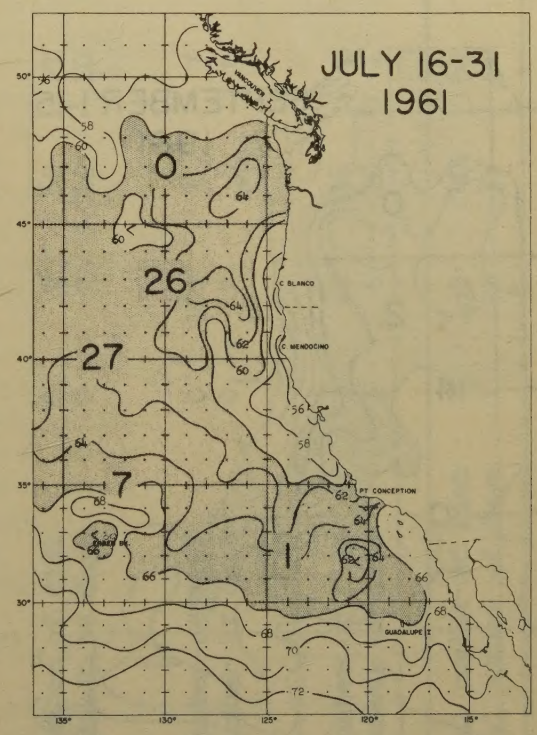


Figure 1.--Albacore catch by U. S. Navy radar picket vessels in June-July 1961. Large numerals represent the catch at each station; small numerals indicate water temperature. Shaded area delimits the 60-66° F. temperature zone. Two-thirds of the 1954-1958 California albacore landings for June-September were taken from waters within these temperature limits.

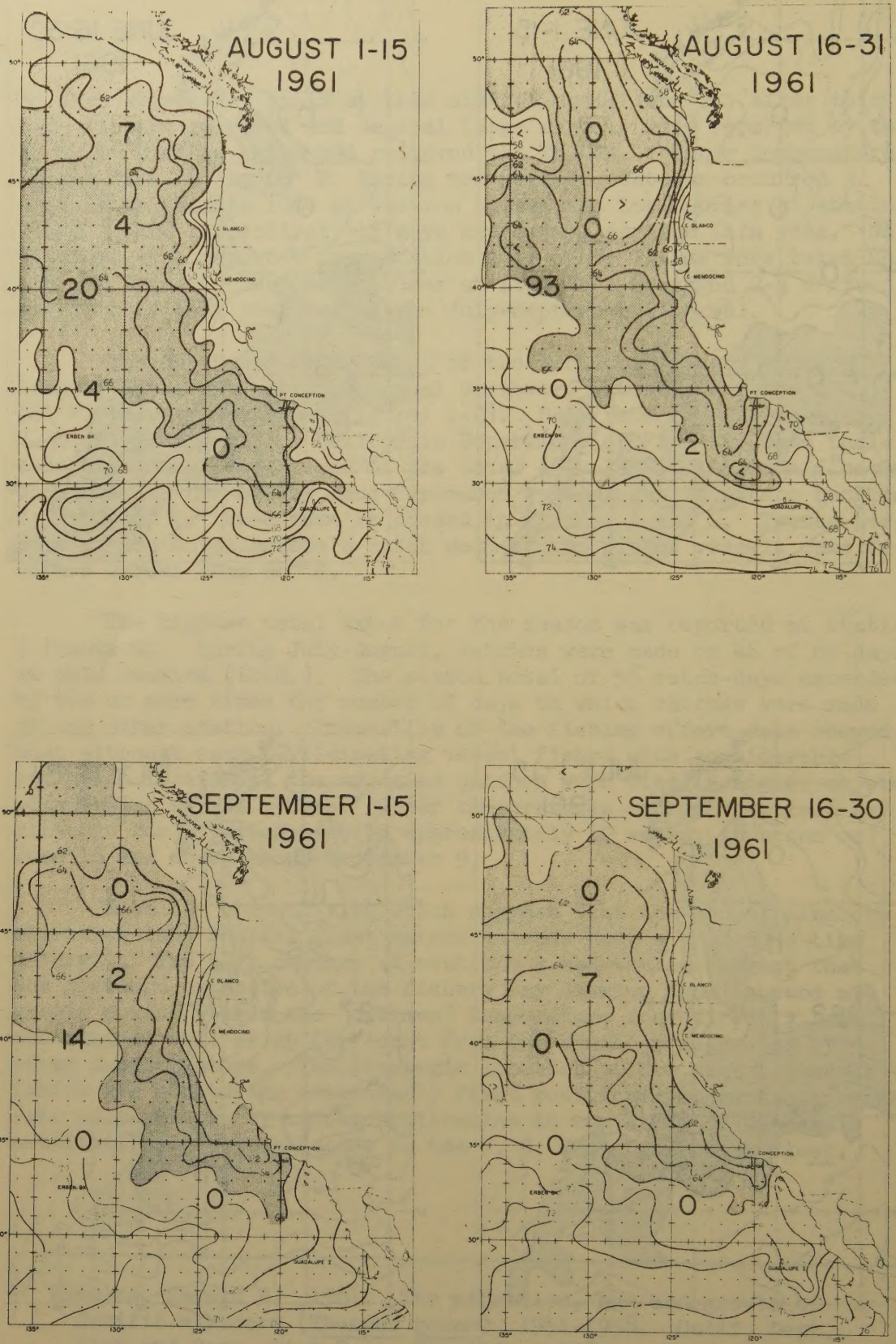


Figure 2.--Albacore catch by U. S. Navy radar picket vessels in August-September 1961. Large numerals represent the catch at each station; small numerals indicate water temperature. Shaded area delimits the 60-66° F. temperature zone. Two-thirds of the 1954-1958 California albacore landings for June-September were taken from waters within these temperature limits.

Table 2.--Number of albacore caught and number of days on which fish were taken by U. S. Navy picket vessels trolling on station, June-October, 1961.

Fifteen-day intervals correspond to 15-day sea surface temperature charts in figures 1 and 2

Station and item	Period										Totals
	June		July		August		September		October		
	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	
1											
Number of fish	0	0	0	0	7	0	0	0	0	0	7
Number of days	0	0	0	0	3	0	0	0	0	0	3
2											
Number of fish	0	0	11	26	4	0	2	7	1	3	54
Number of days	0	0	7	9	2	0	2	5	1	3	29
3											
Number of fish	0	9	62	27	20	93	14	0	3	0	228
Number of days	0	2	12	10	8	16	7	0	3	0	58
4											
Number of fish	0	102	32	7	4	0	0	0	0	0	145
Number of days	0	12	6	6	1	0	0	0	0	0	23
5											
Number of fish	1	24	35	1	0	2	0	0	0	0	63
Number of days	1	6	10	1	0	2	0	0	0	0	20
Total number of fish	1	135	140	61	35	95	16	7	4	3	497
Total number of days	1	20	35	24	14	18	9	5	4	3	133

Each picket vessel was asked to record any observations on albacore abundance, such as large schools, presence or absence of bird flocks, etc. All noteworthy observations are listed in table 4. Sightings of large schools of fish were confined to relatively short periods. At station 3 the 12-day period from August 6-18 may well have offered good possibilities for profitable commercial fishing in this area. Water temperatures reported at the time of observation again are highly correlated with albacore abundance.

Table 4.--Observations of albacore schools made by U. S. Navy radar picket vessels trolling on station, June-October, 1961.

Station	Date	Remarks[1/]	Water temperature (°F)
2	July 18	Large school sighted	62°
	September 15	Numerous small schools sighted	65°
3	August 6	Large school sighted	63°
	August 12	Large school sighted	64°
	August 13	Large school sighted	64°
	August 17	Scattered schools	66°
	August 18	Large school; best day's catch of the year (38 fish)	66°
4	June 26	Large school; good catch (28 fish)	63°
	July 9	Large school	63°
	July 10	Large school	63°
5	June 25	Large school sighted	64°
	June 30	Large school sighted	66°
	July 4	Large school sighted	(missing)
	August 16	Large school sighted	65°
	August 18	Large school sighted	65°

[1/] Observations based on independent judgement of observers aboard each vessel.

Fishery scientists do not fully concur on the establishment of the true age and rate of growth of the albacore. Nevertheless, scientists who have studied the albacore generally agree that the three

length groups which appear in the combined 1961 picket vessel length-frequency data represent three different year-classes (figure 3). The smallest (and youngest) size-group averaged 21 inches long and weighed about 6.8 pounds; this group contributed approximately 36 percent of the total picket vessel catch. The dominant 25-inch group comprised about 40 percent of the total catch; these fish averaged 11.4 pounds each. The 31-inch group made up about 24 percent of the total catch. These fish averaged 22.9 pounds.

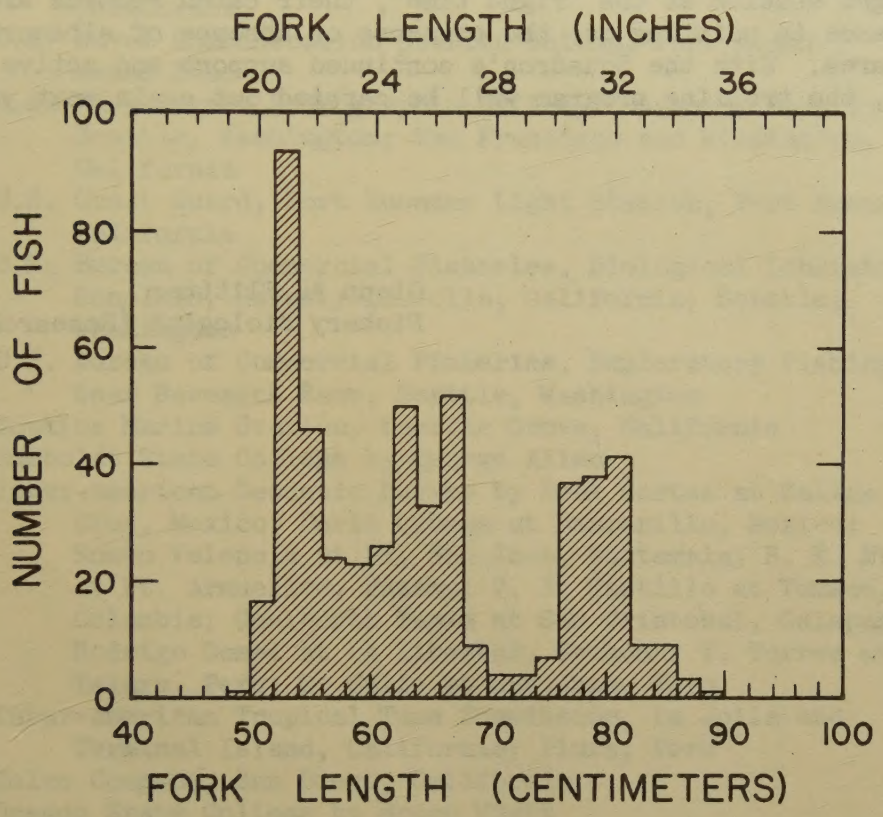


Figure 3.--Length-frequency distribution of albacore taken by U. S. Navy radar picket vessels, June-October, 1961. All stations combined.

The high correlation between sea temperature and albacore distribution and availability warrants further investigation into the problem of predicting sea-temperature distributions in advance for the tuna fleet. The San Diego Biological Laboratory is currently investigating these possibilities, and will keep the fishing fleet informed of its progress.

The enthusiastic spirit of cooperation demonstrated by personnel in Radar Picket Squadron One has made the trolling program yield scientific information of high value. Although not all vessels were as fortunate as the TRACER (high vessel - 145 albacore) in being on the right station at the "right time", their catch records are of equal importance in pointing out the presence or absence of albacore in a given area. With the Squadron's continued support and active participation, the trolling program will be carried out again next year.

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SEA SURFACE TEMPERATURE CHARTS, EASTERN PACIFIC OCEAN
DECEMBER 1961

Acknowledgments

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U.S. Weather Bureau, San Diego, California
U.S. Weather Bureau Ship Visitation Office, Long Beach, California
U.S. Naval Communication Station Balboa, Fort Amador, Canal Zone
U.S. Navy Branch Hydrographic Office, Honolulu, Hawaii; Seattle, Washington; San Francisco and Wilmington, California
U.S. Coast Guard, Port Hueneme Light Station, Port Hueneme, California
U.S. Bureau of Commercial Fisheries, Biological Laboratories, Honolulu, Hawaii; La Jolla, California; Seattle, Washington
U.S. Bureau of Commercial Fisheries, Exploratory Fishing and Gear Research Base, Seattle, Washington
Hopkins Marine Station, Pacific Grove, California
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Ships Frances Salman, Trolleggen, Elin Haven, Besseggen and Kongsholm

Charts

Figure 1.--Mean sea surface temperatures (°F) derived from approximately 8000 observations. Squares show temperatures at weather-ship stations. Numerals on shore are temperatures at coastal and light stations.

Figure 2.--Deviation of sea surface temperatures (°F) from long term mean charts of H.O. 225. Hatched areas are colder than mean.

Figure 3.--Deviation of sea surface temperatures (°F) from those of December 1960. Hatched areas are colder than 1960.

Figure 4.--Sea surface temperatures (°F) by 1-degree squares, approximately 2000 observations. Line under temperatures indicates average of two or more observations. Numerals on shore are temperatures at coastal and light stations.

Figure 5.--Deviation of sea surface temperatures (°F) December 1961 - December 1960 by 1-degree squares. Shaded areas colder in 1961.

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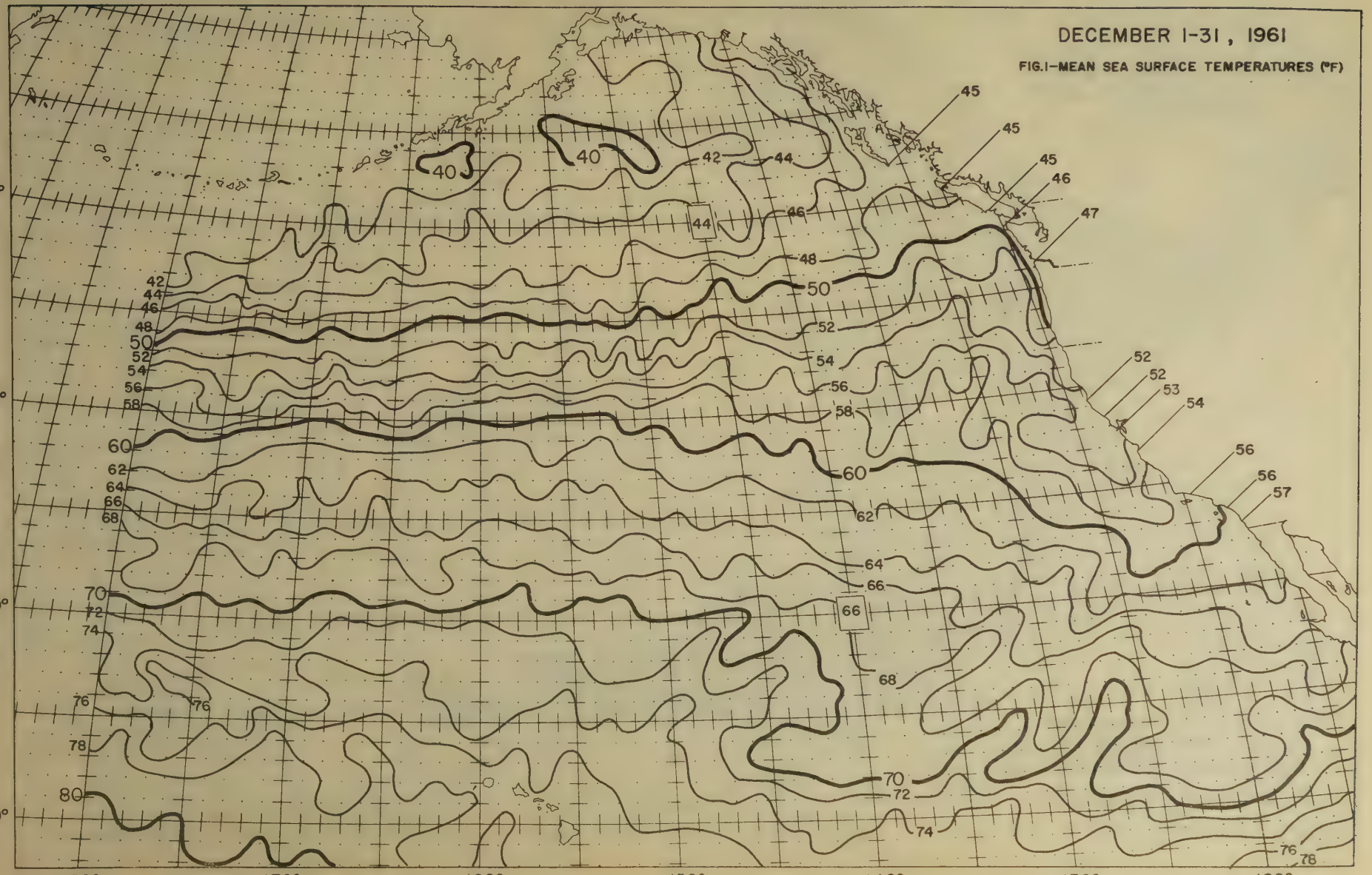
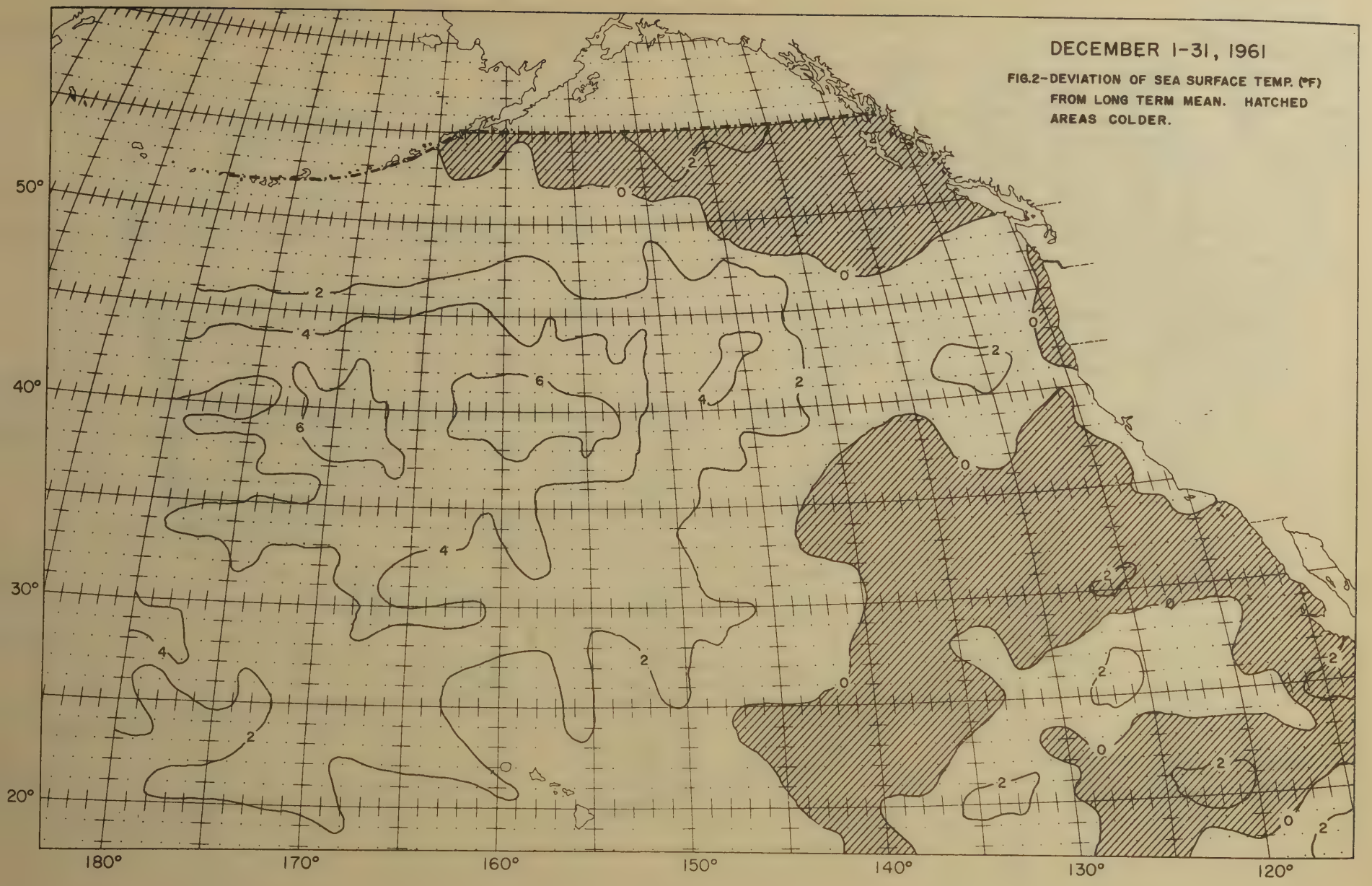
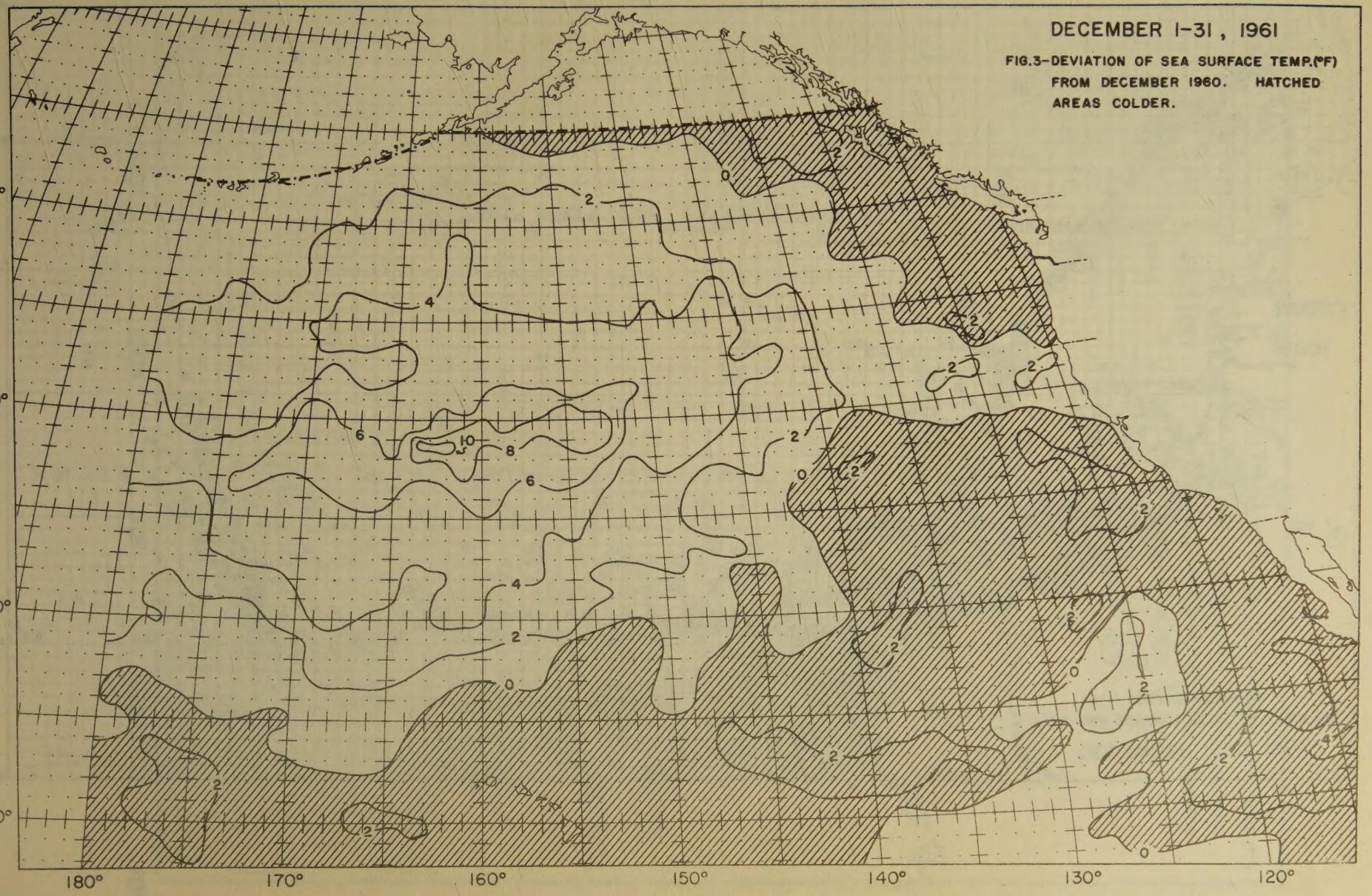
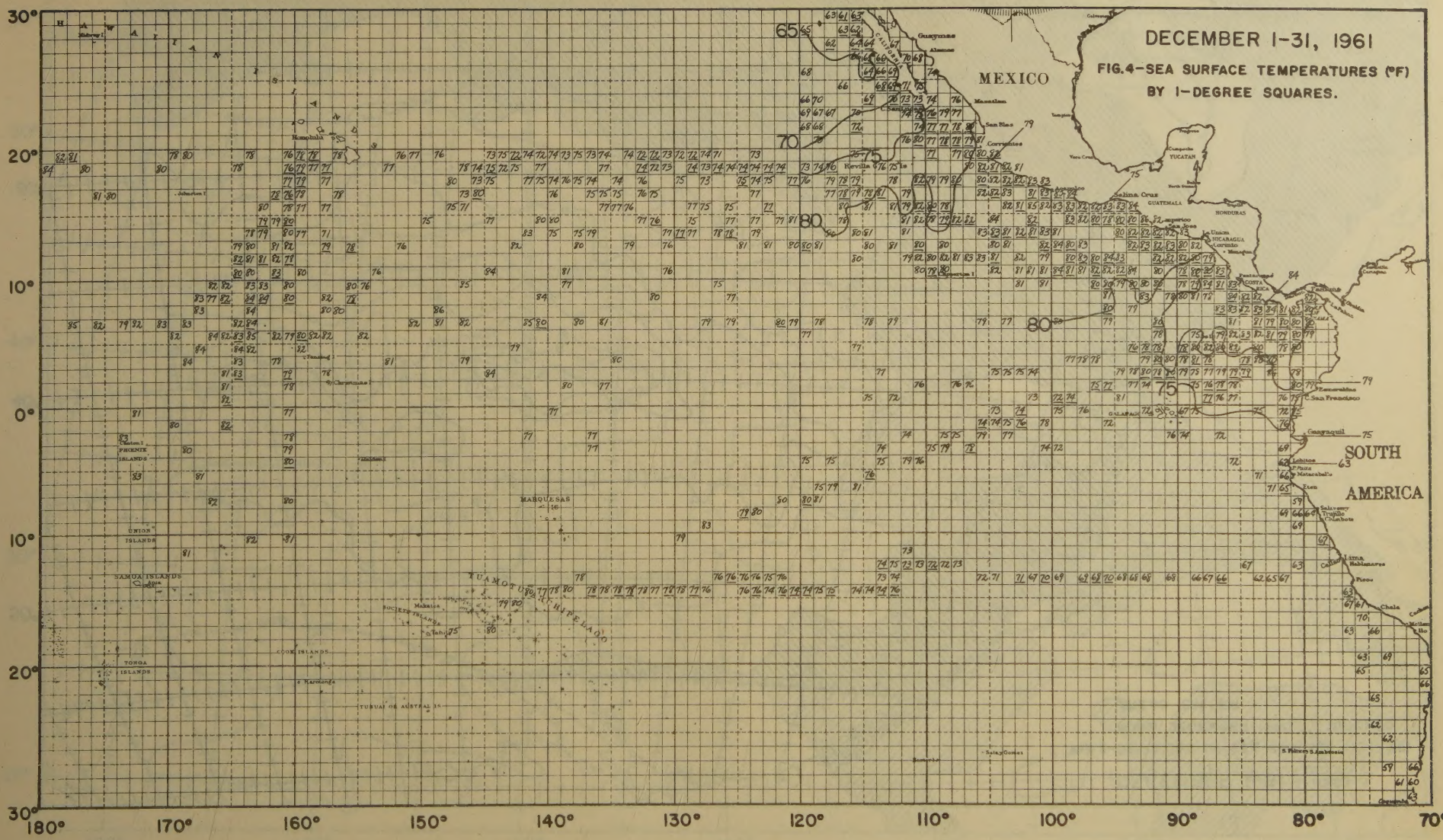

DECEMBER 1-31, 1961
FIG.1—MEAN SEA SURFACE TEMPERATURES (°F)
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


DECEMBER 1-31, 1961
FIG.2-DEVIATION OF SEA SURFACE TEMP. (°F) FROM LONG TERM MEAN. HATCHED AREAS COLDER.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


DECEMBER 1-31, 1961
FIG.3-DEVIATION OF SEA SURFACE TEMP.(°F) FROM DECEMBER 1960. HATCHED AREAS COLDER.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


DECEMBER 1-31, 1961
FIG.4-SEA SURFACE TEMPERATURES (°F)
BY 1-DEGREE SQUARES.
MEXICO
SOUTH
AMERICA
HAWAIIAN ISLANDS
PHOENIX ISLANDS
UNION ISLANDS
SAMOA ISLANDS
TONGA ISLANDS
COOK ISLANDS
TUAMOTU ARCHIPELAGO
MARQUESAS
GALAPAGOS
30°
20°
10°
0°
10°
20°
30°
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°

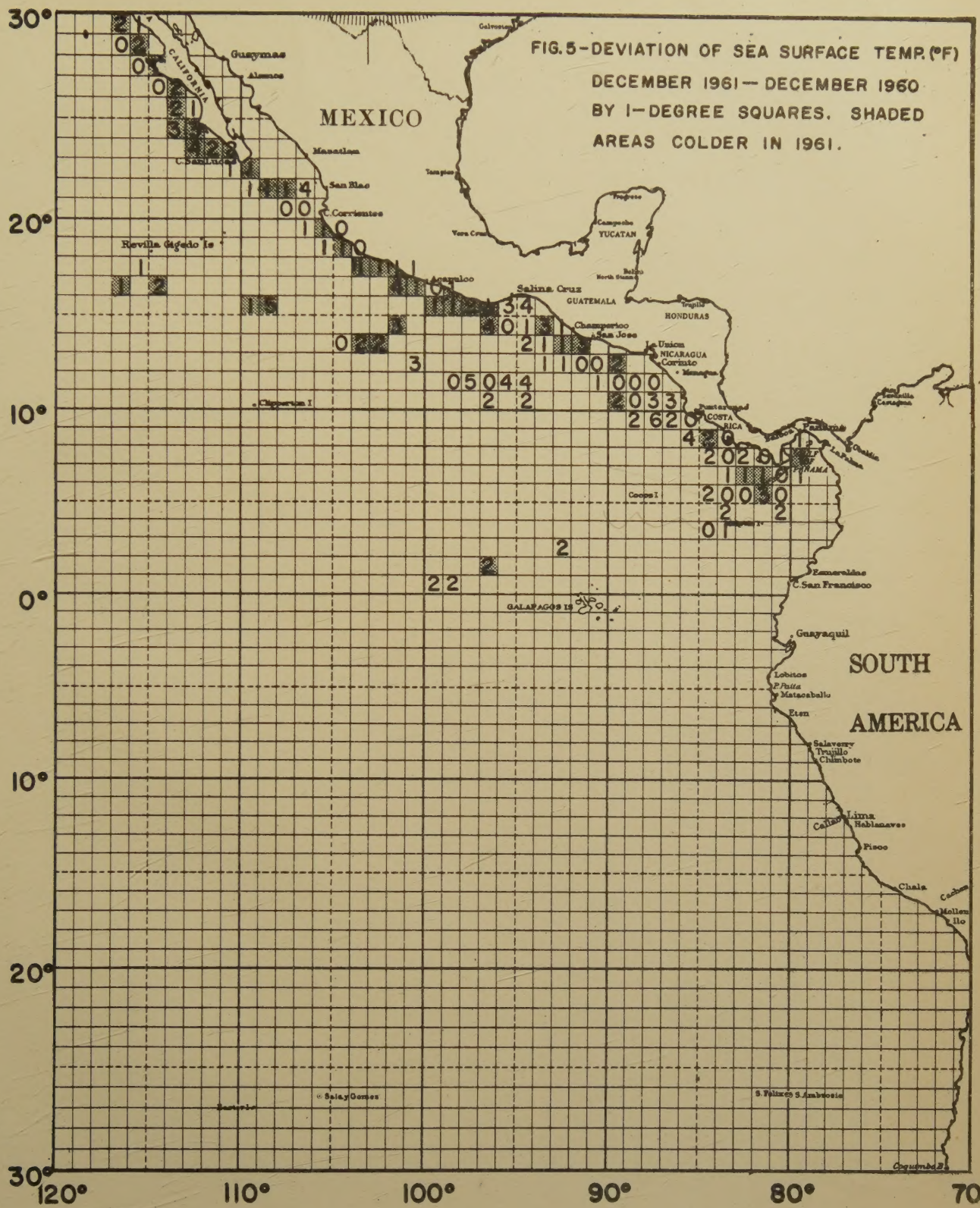
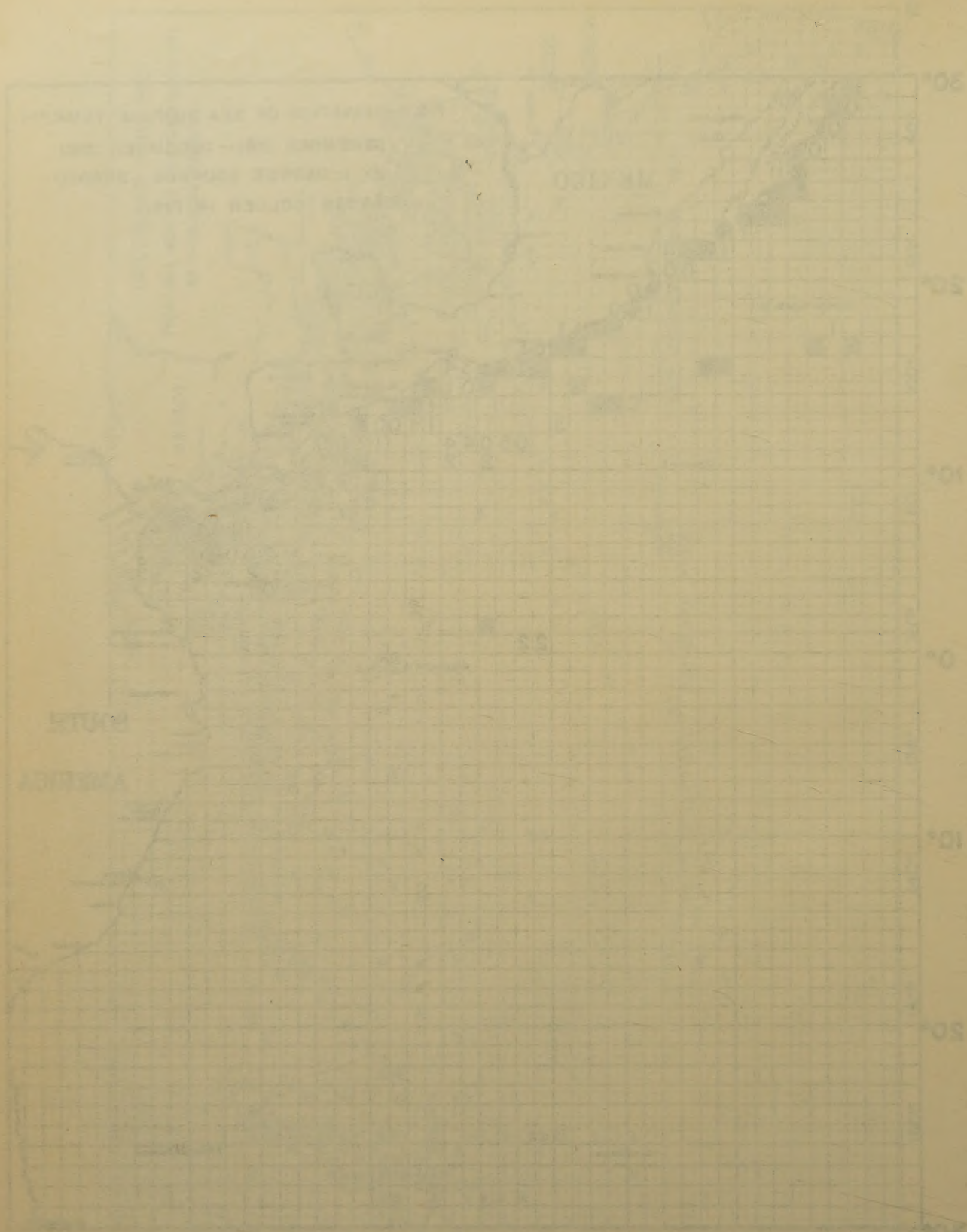


FIG. 5 - DEVIATION OF SEA SURFACE TEMP. (°F)
DECEMBER 1961 — DECEMBER 1960
BY 1-DEGREE SQUARES. SHADED
AREAS COLDER IN 1961.
MEXICO
SOUTH
AMERICA
YUCATAN
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
GALAPAGOS IS
30°
20°
10°
0°
10°
20°
30°
120°
110°
100°
90°
80°
70°



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